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AUTHOR Doles, Daniel T.
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ABSTRACT

In the constantly changing world of technology, migration is not only inevitable but many times necessary for survival, especially when the end result is simplicity for both users and IT support staff. This paper describes the migration at Franklin College (Indiana). It discusses the reasons for selecting Windows NT, the steps taken to complete the migration, the available tool set that simplified the migration, and the ways Windows NT has streamlined network management. Mistakes that were made and a few of the drawbacks encountered are discussed. The paper also covers the pre-migration environment; migration for the administrative users; and migration for the faculty and student labs. The migration at Franklin College accomplished the desired goals. They standardized on a single network operating system, streamlined network administration, and reduced the number of user databases from five to two. (SWC)

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Migration to Windows NT

Daniel T. Doles
Network Manager
Franklin College of Indiana
501 East Monroe Street
Franklin, Indiana 46131
voice: (317) 738-8151
doles@franklincoll.edu

Introduction

In the eyes of many IT professionals "migration" is a four-letter word. The re-configuring and re-training that goes with a migration can be quite overwhelming. However, in the constantly changing world of technology, migration is not only inevitable but many times necessary for survival, especially when the end result is simplicity for both users and IT support staff alike. Such was the case at Franklin College.

Our migration to Windows NT took place during the spring and summer of 1996 and was performed in two phases, beginning with the administrative users followed by the faculty users and student labs. The paper will address the reasons for selecting Windows NT and the steps taken to complete the migration. The available tool set that simplified the migration as well as the many ways Windows NT has streamlined network management will be discussed. Finally, some of the mistakes that were made and a few of the drawbacks that were encountered will be shared as well.

Pre-Migration Environment

In order to put some of the decisions that were made into perspective, a brief overview of our environment prior to the migration would be beneficial. The primary network operating system at the time was Pathworks, which is Digital's implementation of Microsoft Lan Manager. Two separate Pathworks servers were being maintained; one for the administrative users and one for the academic users (faculty and students). Both servers were running the VMS operating system with TGV Multinet providing our TCP/IP transport. Hence, these machines provided POP3 mail service for their respective constituencies in addition to file and print services.

In addition to Pathworks, Novell Netware was being supported on a pentium-based server. This was dictated by our administrative database application, *Campus* from Applied Business Technologies, Inc., which at the time required Netware. The sole function of the Netware machine was to serve this database application.

In terms of the clients on the network, a wide spectrum of "computing horsepower" existed on campus. Our inventory of desktop and laptop computers ranged from 90MHz pentiums with 16MB of RAM and 1GB hard drives to 8MHz 286 computers with 1MB of RAM and a 20MB hard

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drive. With this range in hardware capacity came a variance in software capabilities. Three versions of Windows and multiple versions of DOS were being supported. The existence of machines incapable of running any version of Windows necessitated supporting multiple versions of several production applications including word processing, spreadsheets and e-mail. Adding further variety were the handful of Macintosh machines of different types.

All in all, no fewer than five user databases were being maintained, including two in VMS, two in Pathworks and one in Netware. In addition to the two network operating systems, at least three disk operating systems (DOS, VMS and System7) were being supported. The number of nodes on the network had surpassed 300 and was growing rapidly. With roughly one and a half staff members dedicated to network administration and the variety of platforms being supported, it was clear that network management needed to be streamlined.

Why Windows NT?

The first order of business was to select a single network operating system. At first glance, it would seem that Netware and not Windows NT would be the logical choice, not to mention the path of least resistance. With a Netware server already in place, migration from a mixed environment to strictly Netware would have been simple. However, several factors were examined and considered before our direction was chosen.

First and foremost were the requirements of the ABT *Campus* software. Previous versions of *Campus* took advantage of the strong file sharing capabilities of Netware, making it a necessity. However, a newly released SQL version of *Campus* made the client / server strengths of Windows NT an attractive and viable option.

The next factor considered was the network transport. With the rapid growth in Internet use on campus, TCP/IP had quickly become and will continue to be our standard protocol. The support of TCP/IP by Novell was in its infancy. Windows NT has offered TCP/IP as a transport since its inception.

It should also be pointed out that our academic server was an Alpha 2000 machine capable of running Windows NT. While pure Netware for the Alpha was in the offing, no release date was available. Clearly, preserving our investment in server hardware had some influence on our decision.

Finally, there were some concerns about Novell and its corporate direction. They had just purchased WordPerfect and Quattro Pro and were pouring a lot of effort into development of their new office suite. The fear was that they had lost focus on their true strength, the Netware network operating system. While Novell has since abandoned these efforts, it was cause for concern during our decision making process.

Phase I: Administration

The first step taken was the purchase of a second Alpha. This machine would become the new administrative file server. It would also be our first Windows NT server and hence our Primary Domain Controller. The purchase of this Alpha allowed us to define a one-time migration path for most of our files and applications. It also gave us the luxury of being able to test the built-in migration tools and experiment with some of the management tools available. Furthermore, the addition of this server would ultimately make it possible for us to dedicate the existing Alpha as an SQL database server.

Once the first Windows NT machine was up and running, we immediately installed and configured the Gateway Service for Netware. In a nutshell, the Gateway Service for Netware allows a Microsoft network client to access resources on a Netware network without any Netware client software installed. The Gateway Service for Netware includes the Netware Migration Tool which performs numerous migration functions such as:

- account and group transfers from Netware to Windows NT,
- file and directory transfers from Netware to Windows NT, and
- preservation of effective rights (permissions) on transferred files and directories.

The Migration Tool also allows a trial migration to be performed in order to determine exactly what will be transferred and what will not. However, the one thing the Migration Tool does not do is magically turn a Netware server into a Windows NT server.

After using the Migration Tool to transfer all of our Netware accounts and groups to Windows NT, we configured a Windows NT client and used it to simultaneously connect to a Pathworks share and an NT share. In the Pathworks environment, most of our PC applications were installed in a single share. The contents of this share were copied to a corresponding NT share and then tested. Fortunately, all of these applications tested successfully and none had to be installed from scratch on the NT server. A similar procedure was used to copy and test the *Campus* software with similar results.

It was decided that Windows for Workgroups (3.11) would be the minimum version of Windows supported. Hence, many of the administrative PCs would need to be upgraded. In addition, the nature of the *Campus* software prevents a one group at a time migration. As a result, we were forced to create dual configurations on approximately 60 administrative PCs running version 3.1 of Windows. This process included renaming the current Windows and network configuration, installing and testing a new Windows for Workgroups configuration, renaming the newly installed configuration and then restoring the previous configuration.

Once all the clients had been prepared, we were ready to implement Windows NT for the administrative users. We began by recopying the *Campus* data files. The Netware server was then shut down, the Netware software removed and Windows NT installed. Lastly, we went back to each client PC to invoke the Windows for Workgroups configuration and remove the old Windows and Pathworks configuration.

This phase of the migration began in late February and was completed in early April of the 1996 spring semester. The second phase, which included the faculty and all the student labs, would be conducted during the summer months, beginning in early June. Consequently, the two months in between were used to address the issues that arose following the administrative implementation and to plan the steps to be carried out in Phase II.

Phase II: Faculty & Student Labs

Several factors influenced the planning and implementation of Phase II. First of all, only a portion of the faculty are present during the summer months. Thus, higher priority was given to those on campus. Also, one of our student labs was scheduled for use during summer school and special accommodations would have to be provided for that lab and the students using it. Moreover, the acquisition of more than 75 new PCs resulted in a massive installation and redistribution effort that had to be coordinated with the migration.

Only a handful of the faculty had access to the Netware server and the *Campus* software. Therefore, most of the faculty accounts and groups were not created by the Migration Tool in Phase I and had to be created manually. On the other hand, this also meant that faculty PCs did not have to be dual configured as the administrative PCs were. They were merely prioritized then migrated one after another. The migration process simply entailed upgrading the Windows software and configuring the network software for Windows NT. In fact, many faculty members received computer upgrades as a result of the redistribution project. Their upgrade computer would be configured before being delivered and their old computer either taken away for further redistribution or simply taken away.

In terms of the student labs, the migration to Windows NT brought about the need to reevaluate some of our configuration standards. Prior to the migration our lab machines were all configured with a utility called *Iron Clad*, which essentially write-protected the hard drive and theoretically provided virus protection. In reality, this program made the slightest configuration change quite time consuming and proved not to be completely virus proof. Consequently, we removed *Iron Clad* and replaced it with *Norton Anti-Virus*. The hard drives are no longer write-protected but the critical configuration and initialization files are stored on a write-protected network share and restored each time a PC re-boots.

The redistribution project afforded us the opportunity to add a few specialized servers to our environment. The first of these servers was dedicated to electronic mail. The POP3 server software selected was *IMail Server for NT* from Ipswitch. This product uses its own user database, but we were able to export the Windows NT user database and import it to *IMail* fairly easily. The second specialized server was designated our World Wide Web server and uses the Microsoft *Internet Server* software.

The final step of Phase II was to reformat the academic Pathworks server and configure it with Windows NT and Microsoft SQL Server. The old administrative server continues to function as our primary Domain Name Service server on the Internet. It is also our Kerberos server for college personnel with dial-in access.

Tools of the Trade

There is a plethora of tools, services and utilities that greatly simplify migration to and management of Windows NT. The Gateway Service for Netware, while not intended to provide a permanent solution, makes the transition from Netware to NT extremely easy. Other built-in services such as Dynamic Host Configuration Protocol (DHCP), which dynamically allocates IP addresses, and Windows Internet Name Service (WINS), which provides a dynamic database of NETBIOS name to IP address mappings, offer tremendous management time savings. Services for Macintosh makes sharing files between PCs and Macs easy.

Another feature to take full advantage of is the login scripts. Each time a user logs on to the network, their record in the user database is checked and any specified login script is executed. The login script can be used to connect shares, map a home directory, copy configuration files (as is done in our student labs) and perform many other tasks.

One of the "extras" that comes highly recommended is the Resource Kit for Windows NT. This kit provides supplemental documentation and includes a CD with numerous useful utilities. Some examples include an account creation utility, a Windows-based command scheduler, a batch file user input utility and an Internet name service lookup utility.

Drawbacks and Mistakes

There were not many, but we did encounter some drawbacks. Of primary concern to us was the lack of any supported Domain Name Service software. However, DNS server software is provided and supported in version 4.0 of Windows NT. The lack of a supported POP3 mail server that uses the NT user database for authentication has added some extra overhead to our environment as well. Some of the other applications and utilities that we continue to run in the VMS environment because an NT equivalent does not exist are Kerberos, which is used to validate dial-in users, CSO, which is an e-mail address lookup utility, and the VMS command line multi-key sort utility.

In retrospect, we found a number of things we could have planned or done better and more efficiently. We could have tested Windows for Workgroups more thoroughly and possibly anticipated some of the performance problems that emerged. A lot of post migration adjustments could have been eliminated had DHCP and WINS been implemented initially. Such was the case with a number of features that we discovered during the course of the migration.

Conclusion

In short our migration accomplished the desired goals. We have standardized on a single network operating system. Administration of the network is quite manageable and streamlined. The number of user databases has been reduced from five to two. In the near future we hope to migrate to a new mail system that will reduce this to a single user database. Client configuration is extremely simple and we have narrowed the scope of applications being supported. All in all, the trials and tribulations endured throughout the migration have been repaid tenfold in peace of mind.